

**Governor Brian Schweitzer of Montana**

**The New Homestead Act: Montanans for Bio-Product Development**

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## **Governor Brian Schweitzer of Montana**

### **The New Homestead Act: Montanans for Bio-Product Development**

#### **ABSTRACT**

Governor Brian Schweitzer appointed the State Workforce Investment Board (SWIB), comprised of private, public and tribal representatives, in partnership with the Montana Department of Labor and Industry (DLI), to respectfully request \$15 million in WIRED funding for the evolution of Montana's workforce by creation of innovative biolubricant and bioproduct manufacturing embryonic clusters in the WIRED region of central and eastern Montana (Map, Attachment B.1).

The identified WIRED region, encompassing 32 counties and six Indian Reservations, has historically relied heavily on agriculture as an economic force. Seven years of extreme drought has resulted in regional socio-economic trends comparable to the 'dustbowl era' of the 1930's. These socio-economic trends include: an aging and declining population, wage and salary income that is both depressed and stagnant, a high prevalence of poverty, and an increasing reliance on federal farm subsidies for farm income. Montana must nurture an innovative value-added industry that benefits domestic agriculture and creates globally competitive enterprises resulting in high paying jobs in rural communities. Montana's manufacturing jobs pay an annual wage of approximately \$35,300 per worker compared to an average of \$27,800 for all other Montana workers. In addition to higher wages for workers, a regional input-output model shows that for every job created in an oilseed crushing plant, two additional jobs will be created in the WIRED region. Currently, less than 12% of Montana's manufacturing firms are located in eastern and central Montana.

The strength of rural Montana is the people – the diligent homesteader – and their love for the region. Through our committed partnerships (Montana’s citizens, state agencies, private businesses, investors, academic institutions, entrepreneurs, philanthropists, and Tribal leaders) we will develop new directions for the future of rural Montana, incorporate best practices, and transform our rural Ag-economy including, but not limited to: (1) Systems level curriculum roadmap with supporting course materials using the cluster as context; (2) Delivery models that provide blended e-learning and instructor delivery; (3) Manufacturing Career Cluster model that provides students and incumbent workers the educational information to create a career pathway; (4) Models for increasing collaboration with industry partners to develop a competency-based modular training program; (5) Optimization of biolubricant production in existing industry; (6) Expansion of existing establishment of oilseed processing and refining facilities and (7) Evaluation of new oil crops suitable for production in the arid climate of central and eastern Montana.

Governor Schweitzer declared the WIRED region to be primed for a “New Homestead Act,” as a means to reverse the erosion of central and eastern Montana communities. While a startling number of rural, geographically isolated Montanans live in poverty, with less than 300 miles of Interstate highway, sporadic infrastructure, and only a handful of paved airports; they are also sitting on nearly 89,000 square miles of some of the greatest energy reserves in the nation, be it the wind blowing across the prairies, the crops growing from the ground, or the coal underneath the ground. With advances in biofuels and renewables, the region is well positioned to revitalize the economy with energy development.

**WIRED PROPOSAL TIMELINE**

**INITIATIVE DIRECTOR**

- ◆ Department of Labor & Industry
- ◆ State Workforce Investment Board

**Phase One - 12 months**

Establish ad-hoc advisory group  
 Advertise/hire Initiative Director  
 Recruit entrepreneurs and investment (1)  
 Assist plant establishment (1)

**Phase Two – 12 months**

Recruit entrepreneurs and investment (2)  
 Assist plant establishment (2)  
 Recruit growers  
 Scale-up oilseed production (1)  
 Product marketing (1)

**Phase Three - 12 months**

Product marketing (2)  
 Recruit entrepreneurs and investment (3)  
 Scale-up oilseed production (2)

**RESEARCH & DESIGN**

- ◆ Department of Commerce
- ◆ Montana State University
- ◆ Agriculture Research Centers
- ◆ Tribes
- ◆ 2 Year Colleges

**Phase One - 12 months**

Formulate new lubricants and products (1)  
 New product development (1)

**Phase Two – 12 months**

Formulate new lubricants and products (2)  
 New product development (2)  
 Work with industry to implement production (1)  
 Quality control of new products (1)

**Phase Three - 12 months**

Work with industry to implement production (2)  
 Quality control of new products (2)

**BUSINESS DEVELOPMENT**

- ◆ Department of Commerce
- ◆ MMEC
- ◆ Business Incubator
- ◆ Tribes
- ◆ Peaks & Prairies
- ◆ Sustainable Systems

**Phase One - 12 months**

Complete feasibility of production and expansion  
 Complete feasibility of bio-lube production  
 Develop grant program – Commerce  
 Advertise/hire grant program staff – Commerce  
 Develop/issue formal grant application process

**Phase Two – 12 months**

Expansion and production marketing (1)  
 Bio-lube production & marketing (1)

**Phase Three - 12 months**

Expansion and production marketing (2)  
 Bio-lube production & marketing (2)

**NEW BUSINESS**

- ◆ Department of Commerce
- ◆ MMEC
- ◆ Business Incubator
- ◆ Tribes
- ◆ Private Industry

**Phase One - 12 months**

Feasibility of oil processing prototype (1)  
 Feasibility of refinery establishment (1)  
 Identification of specific products (1)

**Phase Two - 12 months**

Feasibility of oil processing prototype (2)  
 Feasibility of refinery establishment (2)  
 Identification of specific products (2)  
 Construction of new facilities (1)  
 Production of bio-lubes and bio-products (1)

**Phase Three - 12 months**

Construction of new facilities (2)  
 Production of bio-lubes and bio-products (2)

**PRODUCT MARKETING**

- ◆ Department of Commerce
- ◆ MMEC
- ◆ Business Incubator
- ◆ Tribes
- ◆ Private Industry

**Phase One- 12 months**

Regional

**Phase Two- 12 months**

Domestic

**Phase Three- 12 months**

International

**EDUCATION AND WORKFORCE DEVELOPMENT**

- ◆ Office of Commissioner of Higher Education
- ◆ Workforce Development Director
- ◆ Two-Year Institutions
- ◆ Bio-Energy Workforce Development Unit

**Phase One- 12 months**

Conduct RFP (convert manufacturing pathways model to Bio-Energy)

Conduct RFP (develop customized Bio-Energy Cluster-Based

Entrepreneurial education

Formalize Regents' Unified Curricula Models (UCM) for two-year

Economic Development programs (1)

Develop Career Cluster models in Two-Year institutions

**Phase Two – 12 months**

Manage Bio-Energy grants (1)

Establish Bio-Energy Cluster Hub (1)

Implement Regents' UCM to support Bio-Energy Cluster (2)

Establish Workforce Development Partners (WDP) (1)

Identify/develop Bio-Energy industry career clusters (1)

Apply Program Evaluation and Review Techniques (PERT) (1)

**Phase Three- 12 months**

Manage Bio-Energy grants (2)

Evaluate/expand WDP (improve access for low-income adults) (2)

Identify/develop Bio-Energy industry career clusters (2)

Expand Regent's UCM to support Bio-Energy Cluster (3)

Expand Cluster Hubs to support related industries (2)

Apply PERT (2)

**PROGRAM DEVELOPMENT AND DELIVERY**

Central/Eastern Region Educational Institutions and Workforce Development Partners

- ◆ Office of Commissioner of Higher Education
- ◆ Community Colleges
- ◆ Tribal Colleges
- ◆ WIA Providers
- ◆ Adult Education Centers

**Phase One- 12 months**

Apply for RFP funds

Establish business/industry and educational partners network in pathways

curricula development (1)

Create blended e-learning pathways models

Design new learning module requiring contextualized instruction

**Phase Two- 12 months**

Develop Bio-Energy Cluster Hub (1)

Implement Bio-Energy Manufacturing pathways model (2)

Implement customized entrepreneurial curriculum (1)

Continue offering Regents' Unified Curricula Models that support

Bio-Energy Cluster

Coordinate activities with WDP network (1)

**Phase Three- 12 months**

Review and refine Bio-Energy manufacturing pathways model (3)

Expand entrepreneurial education (2)

Expand coordination of WDP network (2)

Expand Bio-Energy Cluster Hubs (2)

Continue offering Regents' UCM to support Bio-Energy Cluster

Develop supporting career clusters models

Apply PERT

## **STRENGTH OF PARTNERSHIPS**

Establishment of a globally competitive bioenergy and bioproducts manufacturing cluster in central and eastern Montana will utilize existing cohesive partnerships with business and industry, education, community development organizations, state and tribal governments and philanthropic foundations. These partnerships will develop sustainable industry in rural central and eastern Montana, create high-paying jobs in management, engineering, marketing, manufacturing and construction, and increase the net return and stability of farm income.

- **BUSINESS AND INDUSTRY PARTNERS**

### **Regional Grower Cooperatives, Existing Agri-Industry and Montana Agricultural Business Association**

These organizations represent the agricultural producers in central and eastern Montana. A value-added biolubricant and bioproduct industry cluster will only be established when producers embrace the potential and divert a proportion of their production to oil seed production. To achieve this end, these partners will work with education and extension services to promote adoption of alternative crop production. Once developed, this conversion to a value-added crop will drive further development of a globally competitive biolubricant and bioproduct industry and continued creation of jobs in central and eastern Montana.

### **Montana and Regional Entrepreneurs**

These partners are investing in projects and are building the economic infrastructure needed for sustainability. Montana currently is home to over 1,442 manufacturing companies (MT DLI). Globally competitive biolubricant and biobased manufacturing businesses are currently operating and private investment in these new ventures is occurring. As the revenue from these businesses continues to grow they will attract outside private capital for expansion.

For example, Sustainable Systems, LLC, has recently acquired an oilseed processing plant in Culbertson, MT, using a combination of debt and equity and is expanding the production of oilseed acres across MT for the manufacture of biofuels, biolubricants and culinary products. Sustainable Systems is in need of skilled engineers, scientists, technologists, maintenance crews, and operators capable of quickly assimilating into a highly complex manufacturing environment. This application will assist in the development of the critical workforce that will maintain global competitiveness. An additional example is **Veteran's Pride**, a MT corporation of retired military officers, partnering with Dr Johnson and the Ft. Belknap Tribe. They are pursuing a camelina, biodeisel approach, with the goal of creating a profit center on the reservation, providing long-term employment and self sustaining revenue streams.

### **Technology Information Exchange, MT Independent Telecommunications Systems/Vision Net/iConnect Montana**

Affiliated organizations are owned and operated by Montana's rural telephone co-ops, providing more than 80% of high-speed Internet access to rural communities, and with thousands of miles of fiber optic cable, are able to connect eastern MT to the world. For the purpose of this project, these entities will assist in developing innovative means for distance learning. Established video-conferencing studios may also be utilized for stakeholders to exchange information.

- COMMUNITY DEVELOPMENT PARTNERS

### **MT Rural Development Corporations – Business Establishment and Support**

### **MT Native American Development Corporation, Montana Ag Innovation Center (USDA Rural Development) and Local Development Corporations**

Montana has several state, local, and federal agencies in place to assist entrepreneurs in establishment and expansion of globally competitive rural businesses. These agencies will assist in regional development of hubs for oilseed processing and/or refining including fundraising, establishment of viable business plans, establishment of processing and refining facilities, and procurement of raw materials necessary for product manufacture and packaging.

- EDUCATION PARTNERS

**Montana State University-Bozeman, Northwest Agriculture Research Center (NWARC), and the Montana Ag Research Centers – Research and Development**

MSU holds several key patents in the area of biolubricant manufacture including motor oils, penetrating oils, greases, hydraulic oils and dust suppressants. MSU will provide experimental amounts of the product for evaluation by industry and independent laboratories. NWARC's Dr. Duane Johnson has and continues to work within the industry to: (1) identify new biolubricant applications and formulate efficacious formulations, (2) educate farmers in production of necessary crops and (3) work with industry to produce the desired product. The NWARC will continue to evaluate conventional and alternative oil crops for production in Montana and as feedstock for biolubricants and bioproducts.

**Montana State University-Bozeman – Research and Development**

Dr. David Sands and Dr. Alice Pilgeram will work with Dr. Johnson to identify and develop new oil crops and new products. Dr. Sands teaches several courses to train students in biotechnology. Students will comprise a workforce capable of continued development of biobased products, optimization of product manufacture and laboratory confirmation of quality and performance.

### **BioEnergy Workforce Development Unit (BioWDU)**

This unit, under the direction of Dr. Arlene Parisot, based out of the Commissioner’s Office of Higher Education, will work toward establishing Bioproducts Manufacturing Cluster Hubs in two-year colleges primarily located within the targeted region. The Office will manage a grant and loan program under contract with the Montana Department of Labor and Industry to implement the WIRED proposal for equipment, training, curriculum development, career ladder building, and distance learning capabilities at the two-year institutions. In addition, the BioWDU will conduct its activities in coordination with the Montana University System Research Centers, the Initiative Director, and existing Industry leaders. These Cluster Hubs will survey industry needs for curriculum development, update skill standards, benchmark practices, and collect information about cluster occupations and programs. The Hubs will also provide a shared library of customized programs, facilitation of “Train the Trainer” (sharing expertise to enhance deficiencies in curriculum) for other colleges and workforce development providers. The BioWDU will also request funds to replicate the existing Manufacturing Career Pathway model refocused to the Bioproducts Industry Cluster in two-year institutions in the targeted region. This will require establishing manufacturing programs linked to K12 and WIA providers and redesigning the curriculum to be contextually-based in coordination with the Bioproducts industry. As appropriate, courses will also be converted to a blended e-learning format.

### **Montana’s Two-Year Colleges - Workforce Training and Product Testing Centers –College of Technology, Tribal Colleges, and Community Colleges**

The two-year colleges, with minor curriculum modifications and additions of equipment, are prepared to offer workforce training in all aspects related to Agriculture/BioFuel/Biotechnology business. The two-year colleges, in collaborative partnership with the BioWDU, will function as

Cluster Hubs for training the necessary skilled workforce through, but not limited to: (1) Diesel technology programs to train new mechanics or retrain individuals to work on engines utilizing bio-fuels and bio-lubricants, which in turn provides feedback to the R&D component; (2) Metals technology programs to train welders and machinists to design, build and maintain crush plants and refining facilities, (3) Construction technology programs to use Agri-based building products and sustainable materials, such as straw board for construction projects; (4) Alternative fuel and sustainable systems training certificates; (5) Maintenance and repair of turbine engines, utilizing bio-fuel and bio-lubricants; (6) Automotive technology programs utilizing bio-fuel and bio-lubricants; (7) Bio-technologists, engineering technologists, and electronic specialists trained to work in the refining and streamlining of systems in the bio-product refineries; and (8) Business and marketing training, with an Ag-based economics emphasis, to aid in marketing of the products within Montana, the United States, and Internationally.

- STATE AND TRIBAL GOVERNMENTS

**Governor's Office of Economic Opportunity (GOEO)**

GOEO will act as a coordinating agent between all parties involved in WIRED to make certain that all available resources in the state are being maximized to ensure the project's success. The office guides businesses to any available funding sources within the state and helps to create strategies for the financing of projects, maximizing the available funds. The office coordinates with local development groups statewide to assist businesses interested in starting, expanding or locating a business in Montana. The GOEO serves as the Governor's representatives to the business community and works to bring all parties to the table to maximize the likelihood of a project's success.

## **MT Department of Commerce**

The Department of Commerce will manage a grant program under contract with Montana Department of Labor and Industry to implement the WIRED proposal. The program will provide grant funds for customized worker training that goes to businesses working with the two year colleges and other training providers on specialized training and curriculum development. Additionally, grants will provide funds to applicants primarily for working capital, equipment, other business needs, and feasibility studies. The Department will coordinate with experienced development corporations such as the Certified Regional Development Corporations and will also provide funding for colleges and K-12 programs consistent with the WIRED proposal.

The principal finance programs that can be used to leverage WIRED funds with the development and expansion of value-added businesses are: Primary Sector Workforce Training Grant Program (\$1.68 million including Workforce Investment Act funds), Big Sky Economic Development Trust Fund (\$1.35 million), Commerce Loan Fund (CDBG) (\$2.4 million), Board of Investments Value-Added Loan Participation Program (up to \$7 million per project possible). The Montana Board of Research, Commercialization & Technology offers \$2.6 million in grants and loans for research and commercialization projects. Commerce administers a number of U.S. Department of Housing and Urban Development programs including Community Development Block Grant, HOME, Section 8, and other HUD programs, which will be utilized as much as possible in WIRED activities.

## **Montana Department of Agriculture**

The department administers the Montana Growth Through Agriculture Program. Through monetary investments in projects, the program establishes public/private sector partnerships that assist in the development of innovative agricultural products and processes to add value to the

Ag Industry, to create new jobs, and to expand small business opportunities. Approximately \$1.2 million is available annually to fund projects that require a 1:1 applicant match, not to exceed \$150,000 per requester. The “New Homestead Act” will likely spawn numerous projects that will be eligible for funding from the program. Since 2001, Growth Through Ag, has provided approx. \$337,000 of funds related to oilseed processing, biodiesel and biolubricant production, and other oilseed derived products.

### **Montana Department of Labor and Industry (DLI)**

DLI will serve this project as the grant recipient and formulate an ad-hoc committee of the State Workforce Investment Board (SWIB) to oversee project development and implementation and the services of the Initiative Director. DLI will solicit bids for hiring of a WIRED Initiative Director (see Bid Solicitation, Attachment B.2). Within the Workforce Services Division of DLI, the following programs and services representing state and federal funding streams will provide opportunities for collaboration with this project: employment service, business advocacy, Workforce Investment Act, Trade Adjustment Act, Migrant and Seasonal Farm Workers Program, Veterans Services, the Registered Apprenticeship and Training Program, and Research and Analysis Bureau for labor market information. The registered Apprenticeship and Training program will be critical to this project due to the rural nature of the region. Businesses can grow their own talent, while the worker/apprentice earns a paycheck and also earning a nationally recognized certification.

- **PHILANTHROPIC ORGANIZATIONS**

The Department of Commerce has an ongoing working relationship with the Northwest Area Foundation (Opportunity Links) and the Montana Community Foundation and will help coordinate WIRED activities with these and other philanthropic organizations.

## STATEMENT OF NEED

Montana's seven year drought, paired with the effect of global markets on the cash crops, that are the anchor of the WIRED region's economy, have made a severe impact on the economic health of the region.

- Agricultural subsidies during the period of ('99-01) came close to equaling actual receipts received for crops produced by farmers in the WIRED region.
- Although less than 20 percent of Montana's population resides in the WIRED region, 24 percent of Montanan's who live in poverty reside in the region.
- Among children residing in the WIRED region, the percent living in poverty is 140 percent of the US Average.
- Currently, there are more than 2,500 families receiving cash assistance (TANF) in the WIRED region, and many more receiving food stamps and other support. 2003 federal income tax data places 10 of America's poorest counties in the WIRED region.

The population of the WIRED region has decreased by 5.8 percent over the previous decade, while the population for the State of Montana has increased by 5.7 percent over the same period.



Average Wages & Salaries – bottom 20 US Counties,  
Of the 10 lowest ranking counties, 8 are in MT  
Source: the Economist, December 8, 2005, *"The Poorest Part of America."*

Unemployment levels for the region have fluctuated between 6.4 and 4.9 percent over the previous decade; however - when jobs are lost, the likely result is that the unemployed workers will leave the region, as the creation of new jobs is not expected. The loss of opportunity in the WIRED region has effectively snowballed into a workforce migration from the region to other

states or to the more economically active western part of the state where employment levels have surged by 25.1 percent over the past five years.

Montana ranks 50<sup>th</sup> in the nation for average wages [DLI]; the average wage in 2004 for the WIRED region was only \$24,863, whereas the average wage for the rest of the state in 2004 was \$28,172, or \$14,485 less than the national average. In 2000, nearly 18 percent of the WIRED region had not graduated from high school, although 31 percent of adults in the region had received some college education, a number on par with the state average. The drop-off comes when we see that while 24.4 percent of adults in the state had achieved a college degree by 2000, only 17.1 percent in the WIRED region had achieved the same level of educational attainment.

The only industry in the region that has experienced substantive growth is in oil, coal and gas extraction, accounting for approximately 2,817 jobs, with the majority of the workforce/facilities based in the WIRED region. DLI research shows that the number of farms owned by corporations and trusts has increased by 4 million acres, while the acreage owned by sole proprietorships and partnerships has decreased by nearly 3 million acres since 1987. As the number of acres needed to remain profitable increases, the need for farm labor decreases, which leads to continued depopulation of the area. As economic well-being has disappeared, so have support industries such as education, healthcare and financial entities.

According to Jim Sylvester, economist at the University of Montana's Bureau of Business and Economic Research, "The problem is keeping young people...that requires economic opportunity. The only economic opportunity proposed is what no one else wants - industrial waste disposal sites, industrial pig farms, chicken farms, and prisons."

The true picture of viability for the region's economy is clouded by the substantial

infusion of federal farm subsidies into the region. Over the past decade, farm subsidies, at their highest level, represented 12.4 percent of the region's income. The WIRED region has taken in an average of 87 percent of the state's \$3.4 billion in domestic federal farm subsidies over the previous decade. Meanwhile, the most recent Doha round of World Trade Organization (WTO) talks in Hong Kong resulted in an agreement to phase out farm subsidies by the year 2013. This would result in a significant loss of income to the farmers and those dependent upon their production in the WIRED region.

The disasters to American energy production in the Gulf of Mexico have pinpointed the vulnerability of the United States to disruptions of energy production. Rapidly escalating prices have impacted Montana as well as the remainder of the United States. The reliance on foreign-produced oil and energy has reinforced the need for both dispersed energy production and diversity of energy sources to maintain U.S. energy security. Recent demand for increased production of bio-energy such as biodiesel and ethanol; and bio-based lubricants (such as greases, hydraulic oils and motor oils) provide opportunities for which Montana is well suited. Shifting the region's agricultural base from being a predominately cash crop economy to one that is boosted by agricultural processing will enable the region to become economically viable and to compete in global markets.

## **STRATEGIES FOR SYSTEM TRANSFORMATION**

### **Objective – Increase Accountability, Local Input, and Serve Those Most in Need**

Montana recently implemented efforts designed to drive system integration and innovation by transforming our workforce system to a single statewide planning area. This began by Governor Schweitzer appointing his State Workforce Investment Board (SWIB) on August 30, 2005 and charging the board with 4 goals: 1) Ensure the workforce system is accountable to the people it serves; 2) Promote more local input and involvement; 3) Get as much money to participants as possible; and 4) Increase services to the last and the least, with a focus on Montana's Native American population. Waiver of 20 CFR 661.300(f) allowed the SWIB to assume the roles of the previous two local boards. USDOL approved Montana's Plan Modification and Waiver on October 11, 2005. Based on this action, it is estimated Montana will save approximately \$1 million dollars of administrative WIA overhead (almost 1/7 of our total WIA funding) that will now go to serve participants in the system. In addition, a duplicative bureaucratic layer has been removed, making the system more efficient and accountable to the people we serve.

The recent efforts of the SWIB have demonstrated that by implementing new strategies designed to drive system integration, innovation and transformation, we are moving Montana forward. As a result, communities across Montana are well prepared to work with industry, business, and Government to implement strategies such as those defined in the WIRED proposal to become competitive in the global economy.

Montana is home to one-third of the nation's coal reserves and the nation's fourth greatest wind resource, and plans are currently underway in the state to develop both resources.

### **Objective – Expand Employment and Advancement Opportunities**

In an effort to expand employment and advancement opportunities for Montana’s workers and catalyze the creation of high-skill and high-wage opportunities we must develop an embryonic industry cluster. The cluster is in the early stages of development and its social and support structures are also just emerging, resulting in a greater need for support from entrepreneurs, R&D, and seed or venture capital (See Cluster Profile, Attachment B.3). Cluster development requires state policy options to develop human resources for the cluster. To prepare the current and future workforce to support the emerging biotechnologies, Montana looks to the 2004 Washington State’s Snohomish County Triad Initiative funded in 2004 by the U.S. Department of Labor, High Growth Job Training Initiative (AACC, Dec. 2005, Jan. 2006).

### **Objective - Reduce the Brain Drain and Increase Educational Pathways**

This model proposes developing standard and advanced level curriculum with multiple delivery options, including distance learning. It addressed the need for an “aerospace” career ladder and related educational pathways. The Triad represents education, industry and government partnerships. Modeling components of this “Best Practice” supports the Montana WIRED initiative to regenerate a regional economy. As the Washington model responded to a decision by the Boeing Company to build their aircraft from composite versus traditional metal materials, so does this Montana “Triad Partnership” to use alternative crops to support a bioenergy and bioproducts economy in central and eastern Montana.

One of the key elements of the Washington model focuses on the “New Learning Model” that emphasizes teaching in a contextual team environment. Montana has invested Carl D. Perkins federal funds to introduce and encourage contextualized instructional methods in secondary and postsecondary education. The state also dedicated a portion of its Incentive Grant

funds from the USDOL and Carl D. Perkins State Leadership to develop curriculum models in two-year colleges focused on Career Clusters and its related pathways to connect the educational pipelines. These grants required infusion of contextualized instruction as well as partnerships with business and industry, education, and workforce development within their region. The Manufacturing Career Cluster model that has been developed can be replicated in this project. A state educational policy option related to Career Clusters development would further these efforts.

For the Indian Nations in the WIRED region, there is significant opportunity to utilize Section 166 WIA funds and Tribal TANF funds to create vocational training opportunities for high school youth, through apprenticeship and on the job training opportunities, such as those successfully implemented in partnership with Salish & Kootenai College, Ft. Peck Community and Blackfeet Community College.

Implementing MSU Northern's dual enrollment option (high school-2yr university credit) we can create the basic foundation of knowledge and skills required for any manufacturing pathway.

### **Objective – Increase Responsiveness & Reduce Redundancies**

A current state policy option linked to this initiative is the Montana Board of Regents' 2005-2010 Strategic Plan that sets as a goal the need to assist in the expansion and improvement of the state's economy through the development of high value jobs and the diversification of the economic base. To achieve this goal, the system must increase responsiveness to workforce development needs by expanding and developing programs in high demand fields in the state.

There are two recommendations being considered by the Montana Board of Regents:

- establishing *Regents' Unified Curricula Models* for two-year programs in high demand, high skill occupational pathways within a career cluster.
- establishing *Cluster Hubs* in two-year institutions located within a regional industry cluster system or connected.

Each of these proposals would serve a specific purpose—to provide training that is driven by economic and workforce demands, regional and/or statewide. Both of these proposals represent a transformation in structure founded upon current knowledge of Career Clusters as an organizational tool for instruction and Industry Clusters as an innovative economic model.

### **Objective – Increase Accessibility to Education/Training Options**

The educational model for this initiative would be driven by the outcomes expected as identified in the Washington Triad Partnership model: (1) systems level curriculum roadmap with supporting course materials using the cluster as context, (2) delivery models that provide blended e-learning and instructor deliver, (3) Manufacturing Career Cluster model that provides students and incumbent workers the educational information to create a career pathway and (4) Models for increasing collaboration with industry partners to develop a competency-based modular training program.

Establishing bioproduct embryonic industry clusters allow for an infusion of contextualized instruction greatly benefiting rural economies and Tribal Nations initially in Montana, with the potential for growth into neighboring states, such as North and South Dakota, suffering a similar economic plight. Establishment of an industry cluster to produce biodiesel, biolubricants and bioproducts will provide a globally competitive economic opportunity compatible with Montana's rural communities and environment of central and eastern Montana.

## **Objective – Retain and Increase Population – Maximizing Value-Added Ag**

Markets for biodiesel blends in the US have grown from 25 million gallons in 2001 to over 500 million gallons in 2005. This growth has been stimulated by several factors including: 1) a competitive price with petroleum-based diesel, 2) a greater concern for reduced tailpipe emissions, 3) a federal mandate to remove sulfur as a fuel additive and 4) tax incentives to produce a blended biodiesel:diesel mixture.

Biolubricants are another growing market. The annual consumption of automotive and related lubricants is 4.5 billion pounds per year (7.6 lbs/gallon). Approximately 42% of this amount, or 1.89 billion lbs (249 million gallons) is used as motor oil. An additional 27% or 1.2 billion lbs is used as hydraulic oil. Market analysis by the USDA, Briggs and Stratton Mfg., and the United Soybean Board have shown consumers are willing to use biobased materials. Surveys indicate a 28% acceptance of bio-motor oils and a 63% acceptance of bio-hydraulic oils. In the case of the bio-motor oils, tailpipe emissions have been reduced 38%, and the used oil remains non-toxic and biodegradable. The oils also reduce engine friction providing an average engine with an additional 4-5 base Horsepower and a 3-4% increase in fuel economy.

The initial focus of this project will be a biolubricant manufacturing cluster. Research and agents from the Montana Ag Experiment Station, Montana Extension Service, and the Initiative Director will work with growers to increase production of oilseeds. Crop production systems will be selected based on acres suitable for oilseed crop production.

Existing crush plants will be expanded and new plants established throughout the target region. Crush plants will process oil seed from an area encompassing 12,000 to 20,000 acres. The crush plant will be designed to operate 24 hours per day, 320 days per year. Staff will be trained to operate and maintain equipment and to handle the two primary products: oil and high-

protein meal. Meal will be transported to livestock feeding operations or to a pelleting mill for the manufacture of animal or fertilizer products. The oil will be pre-processed for shipment to a regional refining facility. More than one crusher may be used to supply a centrally-located refiner.

The refiner will convert the oil into the primary products of methyl esters (biodiesel) and glycerin. In some cases, the base oil can be used for product manufacture. Further conversion of the methyl ester products to value-products is feasible. Biolubricants will be manufactured to industry requirements. Refineries will require highly skilled technicians for quality control and quality assurance of each production run. Staff at this level will include a laboratory technician trained to do essential chemistry, management, accounting, transportation and packaging, as well as engineering staff and electronics specialists for process optimization. Biolubricants meeting quality standards will be sent to the College of Technology for full performance evaluation. Those passing the test protocol will be marketed as motor oils, hydraulic oils, cutting oils, cosmetics, or other products produced by regional private enterprise. Oils which do not meet the standards of the biolubricants may be remanufactured into biodiesel. The ratio of manufactured biodiesel to biolubricant will be dependent upon market factors. Additional refineries may be required to manufacture specific products such as erucimides and estolides, each of which show great promise with the global economy.

Lubricants represent a 4.0 billion gallon industry in the U.S. It would be highly desirable from many standpoints to convert a sizable portion of this lubricant from petroleum-based to vegetable oil-based, Montana has the resources to develop this value-added industry and become the leading producer of high-quality, environmentally friendly biolubricants.

### **Objective – Reduce Unemployment, Depopulation & Increase Personal Income**

The primary sectors of the workforce that will benefit from this initiative are farmers and rural agricultural businesses. The proposal will initiate work with existing biobased oilseed processors to enhance their capabilities and to develop a systematic approach to new proposed facilities. Expansion of this industry will require scale-up of oilseed production and scale-up of the workforce to support this industry throughout Montana. Oilseed crops are more valuable to the producer than commodity grain crops. This farmgate value would be further enhanced by farmer participation in production of value-added products such as biolubricants and biofuel. This will benefit the community by increasing local purchasing of services.

Simultaneously, we will establish infrastructure to process, package and market biolubricants and bioproducts. This infrastructure will be located close to production in order to minimize transportation of raw materials from the farmer to the manufacturer. We anticipate that a minimum of twelve community scale oil pressing plants and pre-processing facilities, will be required to meet market demand. Each pressing plant will employ approximately 12-15 employees and each processing facility will employ 4-5 employees per shift. These new jobs include engineers, chemists, marketing specialists, accountants, and workforce labor. Laborers at all levels will earn better than average salaries or wages to ensure production stability and longevity. In addition to this designated workforce, there is effectively a 3-fold multiplier, for every one person in manufacturing there is an average of 2 related jobs in health care, professional services, etc.

### **Objective – Reduce Dependence on Farm Subsidies, Increase Economic Viability**

- Canola is the primary oil for the manufacture of bio-based motor oils suitable for 4-stroke engine applications including gasoline- and diesel-powered vehicles. The cost of manufacture of

bio-based motor oils is midway between conventional and synthetic motor oils. This oil is in test by the U.S. Army.

- Oleic safflower does not contain polyunsaturated fatty acids (PUFA) such as linolenic acid, which makes it a very stable oil for both edible and industrial applications. Currently, MSU Bozeman and Sustainable Systems, LLC has developed the technology to manufacture an efficacious safflower oil-based hydraulic oil. This oil is in test by the U.S. Army
- Camelina is a source of omega 3-enriched oil. These oils are highly desired in the food and feed markets. However, the low cost of production also makes them a candidate for the manufacture of biodiesel. Approximately 75% of biodiesel cost is in feedstocks. Consequently, while soy and canola biodiesel cost approximately \$2.20-\$2.85/gallon to manufacture, camelina biodiesel can be made for \$1.80-2.00 /gallon. They are also excellent candidates for the manufacture of wax esters, commonly used in cosmetic products from foundations and lipsticks to shampoos and hand lotions. The wax esters also represent a new potential market in motor oil manufacture and in metal cutting oils.
- Crambe and rapeseed - the primary oil produced in the seed of crambe and rapeseed is a monounsaturated fat called erucic acid. Erucic acid is primarily used to manufacture erucimides, a slip agent used in metal manufacture and as a coating on poly-films commonly used to protect food such as "Saran Wrap". Erucimides are currently only produced in Europe, but transportation costs have stimulated buyers to seek U.S. production.

#### **Objective –Increase Job Opportunities & Earning Income Potential**

- **Erucimide production (crambe and rapeseed).** Erucimides represent a potential market in Canada of 4-8 million pounds annually. To produce erucimides from crambe or rapeseed oil just for the Canadian market would require employment of 75-150 skilled people working in

everything from production to oil extraction, methyl transesterification, oil separation and erucimide production. The byproducts from this process would result in the production of a meal suitable for use as a soil fumigant, a fertilizer or as a protein base for adhesive manufacture. The crop production requirements would be 15,000 to 25,000 acres of land. The value to Montana for erucimide production is expected to be \$150 million. Sustainable Systems, LLC currently processes rapeseed and crambe and ships the crude oil out of state for the manufacture of slip agents. Manufacturing of higher value erucimides within the state would allow Montana to retain additional revenue.

- **Motor oil production (Canola).** Canola-oil based estolide motor oils are expected to be highly competitive with synthetic motor oils in price and to exceed their ability in lubricant performance. Production requirements would exceed the available land in Montana. However, maximizing Montana production would employ 20 to 30 people per crushing plant, 5 to 10 people per refining plant and 20-30 people for marketing and distribution. The total people involved would equal 300-400 people from production to sales. The estimated value of the motor oil would be \$36 million per year.

### **Objective – Increase Job Growth, Market Opportunities & Investments by Private**

#### **Industry**

- The Initiative Director will work closely with industry to identify market opportunities for derivatives of vegetable oils. The targeted products will be researched by the MSU staff and a production protocol developed. Industry will analyze the protocol and make recommendations related to costs of manufacture. The team will meet with a targeted community development officer and local industry leaders (including local bankers, government leaders and targeted buyers). MSU-Bozeman will provide experimental

amounts of the product for evaluation by industry and independent laboratories.

- MMEC and organizations such as Veteran's Pride will assist in industry feasibility studies, provide a number of engineering and business services and project management as required at each stage of business and product development and operation. Initially, MMEC expects to conduct manufacturing feasibility and cost-benefit analysis and process modeling / simulation to provide the data required for marketing and financial analysis, to be provided by other entities, which are critical to successful product launches and business development. Once feasibility is established these entities can provide business systems, facility planning and plant layout services to ensure resources are appropriately applied, then employee training, quality management and Lean manufacturing to produce a quality product in the most efficient manner. Local industry leaders, such as Peaks and Prairies, Great Northern Growers, Sustainable Systems, LLC, Montana Biotechnologies and members of the farm community will work with potential buyers and the Montana Department of Commerce and the Montana Department of Agriculture to develop production contracts and required standards.